



U.S. DEPARTMENT OF
ENERGY

Savannah River Site Strategic Plan

September 2011



- NATIONAL SECURITY
- CLEAN ENERGY
- ENVIRONMENTAL STEWARDSHIP



shaping the business of SRS success

we know
where we've been...
where we are...



Now, we look
to a new path...

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**As we embrace our future
at the Savannah River Site, I am pleased to share
with you the SRS Strategic Plan for 2011-2015.**

This plan charts a course for the Savannah River Site (SRS) to continue its long-held tradition of maintaining environmental stewardship and national security while providing lasting solutions to major issues and challenges that touch the very fabric of our nation. Many of you commented on the draft Strategic Plan as well as our Draft Enterprise SRS Vision document. Both have been merged into one plan in the following pages. Numerous suggestions and comments were incorporated following careful consideration of all input received.

As we approach the end of a highly successful campaign to accelerate projects that have restored the environmental integrity and usability of over 75 percent of the land area previously used to end the Cold War, we are looking to the future with optimism and commitment to continue our heritage of national service. SRS is not a closure site. Rather, SRS is open for business and we have the capabilities to solve some of our nation's unresolved issues.

We are busy transforming past environmental liabilities into revitalized and repurposed assets for future use – for national security, clean energy development and environmental management. This Strategic Plan will guide us as we continue to demonstrate resilience, innovation and outstanding service. And each of us has an active role to play, including Federal employees, Site contractors, private industry partners and community stakeholders, whose support is essential.

We will use our exceptional knowledge and experience in the management of nuclear materials to acquire new Site missions that enhance national security, create lasting technological solutions to the challenges facing the development and use of nuclear energy and safely dispose of high level liquid wastes. We will also ensure we maintain the infrastructure and talent to be at the forefront of nuclear materials technology development.

Our ability to innovate and create lasting nuclear technology solutions is a true testament to the quality of our workforce serving SRS throughout its history. We are fully committed to maintaining that strong commitment and level of service to our country, and we will adapt as necessary to changes in policy and direction that occur as a result of new strategy. For instance, the recommendations from the *Blue Ribbon Commission on America's Nuclear Future* may impact the road ahead.

We see SRS as a nuclear materials enterprise rather than a distinct and separate group of missions and organizations. We are dedicated to taking steps to ensure we operate as an integrated and connected enterprise that allows the flexibility and talents of diverse organizations to operate in a cohesive and connected manner.

We are pleased to present you with the SRS Strategic Plan for 2011-2015, and give you our commitment that this is a “new first step” in a journey to restore vital roles of the SRS and Savannah River National Laboratory (SRNL) for many years to come.



**A message
from Dr. David Moody**

Manager

**U.S. Department of Energy—
Savannah River Operations Office**



Savannah River Site Background

The Department of Energy's 310-square-mile Savannah River Site is located in the central Savannah River region of South Carolina. The Site has over 15,000 acres devoted to industrial facilities, research laboratories and supporting infrastructure. Over 90 percent of SRS is not developed.

Our safety culture has a long history at SRS and continues to be our highest core value. All SRS operations are performed with the highest regard for the safety of the employees, the public and the environment.

Each SRS worker is committed to executing work responsibilities in such a way that strives for zero incidents. In addition to personal safety, SRS work scope is carefully executed in compliance with all applicable regulations.

These include federal, state and local laws and other binding regulations such as DOE directives. Further, each employee strives to make his or her work contribution in accordance with the highest moral and ethical standards.

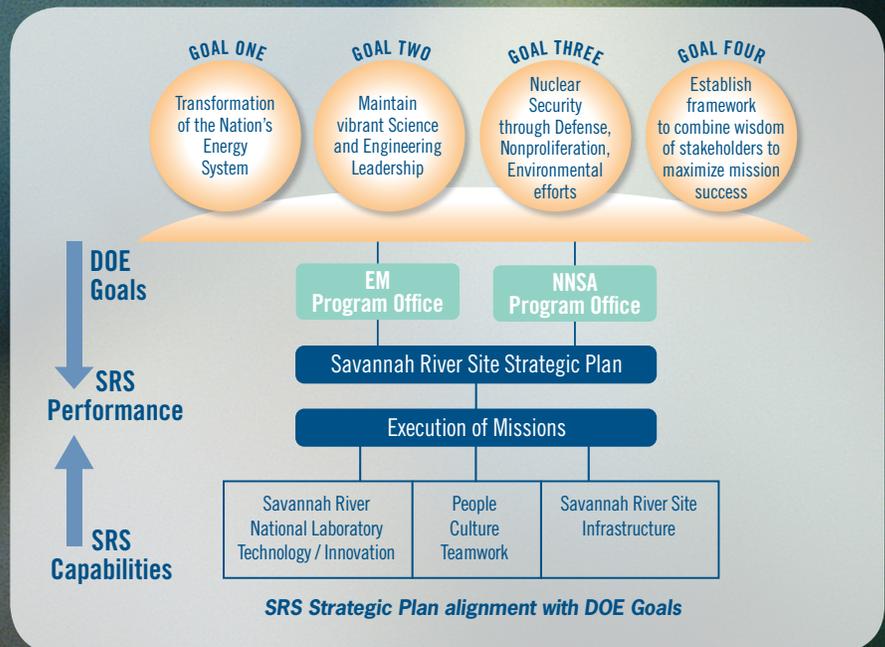
SRS success is built upon this non-negotiable foundation.

The mission of DOE is to ensure America's security and prosperity by addressing its energy, environmental and national security challenges through transformative science and technological solutions. Three primary programs at SRS support the DOE mission: Environmental Management (EM) responsibilities for cleaning up the Cold War legacy and preparing for long-term stewardship including maintenance and environmental health; National Nuclear Security Administration (NNSA) Defense Programs; and the Defense Nuclear Nonproliferation Program.

purpose vision

SRS will be a long term national asset viewed with confidence by the public. SRS workers will be effectively employed in service to our nation in national security, clean energy and environmental stewardship. This will be achieved through application of our management core competencies in nuclear materials, spearheaded by SRNL. The SRS Vision and Strategic Plan are directly aligned with the mission of DOE.

The purpose of the SRS Strategic Plan is to share the future vision for SRS and the strategy for achieving that vision while continuing to successfully execute current missions and meet commitment milestones. This plan also provides tactical information about how we will start moving forward. However, additional execution details can be found in other lower level planning documents.



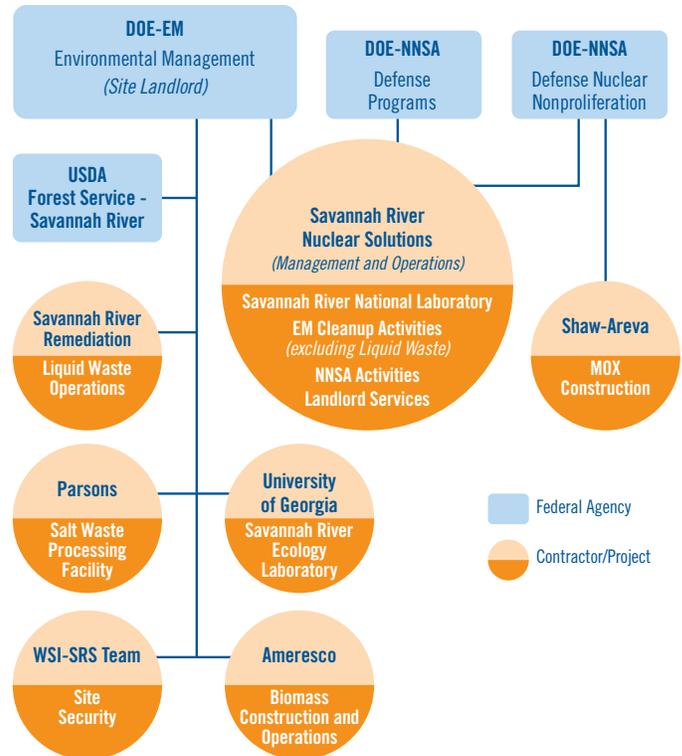
To execute these missions, the Department of Energy (DOE) uses a number of contractors, including a traditional Management and Operations (M&O) contractor. DOE is also responsible for natural resources management at SRS, which is accomplished by the U.S. Department of Agriculture (USDA) Forest Service-Savannah River.

In addition, SRS is the first National Environmental Research Park, an independent outdoor laboratory managed by the Savannah River Ecology Laboratory (SREL).

Staffs from the Nuclear Regulatory Commission, the Defense Nuclear Facilities Safety Board, the Environmental Protection Agency and the South Carolina Department of Health and Environmental Control are either resident on Site or regular visitors to fulfill their regulatory and advisory duties.

SRNL provides technical innovations and solutions for SRS missions and serves diverse national interests at other DOE sites and for other federal agencies.

DOE assigned EM as the Site landlord, responsible for managing critical support functions that serve all DOE missions and tenants at SRS.



cultural values

The SRS workforce is key to successful execution of the Site's strategic initiatives. People are our most valuable resource, and outstanding safe performance is essential if we are to succeed.

At SRS, we aspire to achieve success by embracing a culture that values the skills, diversity and contributions of all employees to meet the challenges facing the nation. A positive culture requires a committed workforce and exhibits the following attributes:

- Promoting and sustaining continuous learning, open communication and accountability
- Embracing different perspectives and creating an atmosphere of teamwork
- Creating an environment that encourages innovation, motivation, and partnership
- Adapting to the mindset that SRS is a business enterprise: customer focused, competitive, results driven
- Perpetuating the "safety first, can-do" attitude from our proud history of national service
- Becoming recognized as the most flexible and customer responsive enterprise within the entire DOE Complex, with adaptive business and operating systems that promote positive business relationships with external organizations



We know where we've been.

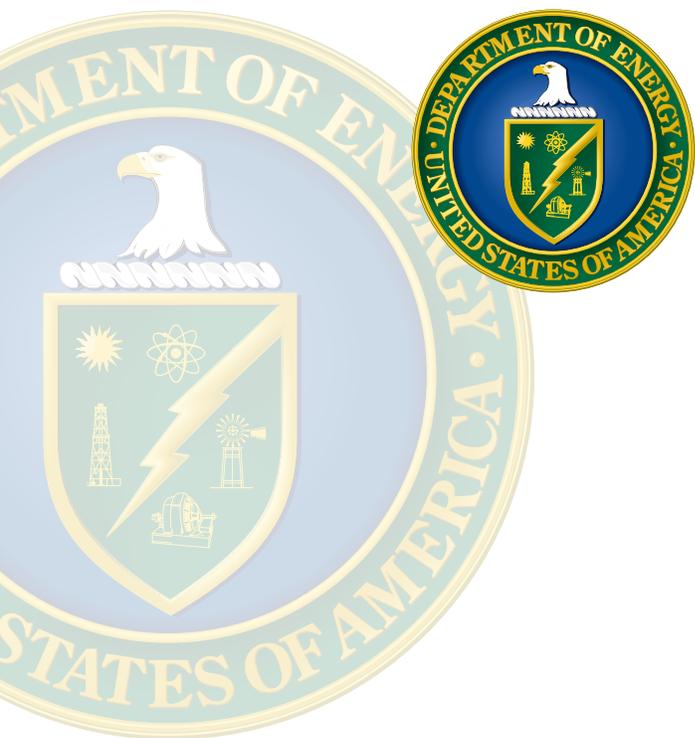
SRS has a history of national service. From its inception in the 1950s, SRS has provided knowledge, technology and integrated solutions for our most pressing national needs. The scale and boldness of SRS contributions were forged in the nation's need to win the race for worldwide nuclear weapons superiority. For nearly 40 years, SRS pioneered the development of new nuclear technologies and deployed those technologies at scales not previously demonstrated by mankind. Achieving that success required massive investment, extreme personal sacrifice and the creation of untold innovations. Entire communities were relocated, a world-class workforce was created, and infrastructure—never before imagined—was built in record time. By the late 1980s it was clear to the world that the U.S. nuclear capability would serve as a deterrent to any other nation's ambition to launch a broad nuclear attack. SRS accomplishments continue to stand at the core of our nation's nuclear deterrent.

We know where we are.

Current SRS missions are important to the nation and the region.

Today, SRS continues its heritage of national service through its work on environmental stewardship while sustaining environmental health, national security and clean energy technology development conducted under high security measures. These activities support the mission of the DOE-EM Program, NNSA and the needs of the nation and the region. This work, which includes that of SRNL, represents important practical application of SRS's nuclear expertise and engineering capability to safely and effectively manage nuclear materials including disposition of proliferable materials and manufacture of critical nuclear weapons components. These materials include surplus nuclear materials from the weapons program, solid and transuranic wastes, domestic and international used research reactor fuel, and legacy liquid wastes at SRS. In addition, SRS continues aggressive efforts in the area of environmental stewardship through initiatives such as groundwater restoration, deactivation and decommissioning of excess contaminated facilities, and radioactive waste disposition.

At the same time we are executing this important continuing work, new missions are being developed at SRS to support our nation's goal to reduce the global availability of proliferable nuclear material.



Now, we know we must put SRS on a new path of national service.

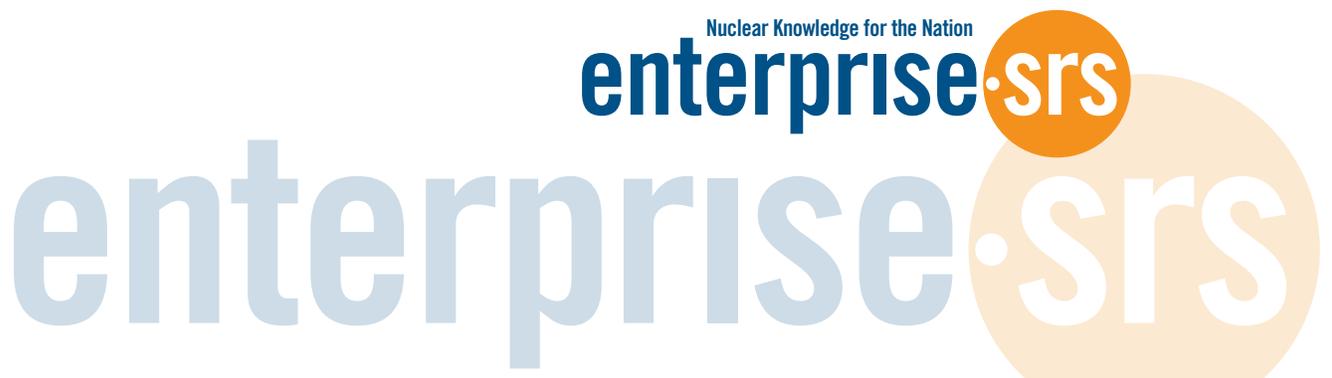


SRS has always served the nation with innovative approaches and a solid commitment to getting the job done. Our history has prepared us with an unparalleled workforce and a set of physical assets that are unique in their scale and flexibility to store, process, track and control a wide range of nuclear materials. As stewards of these national assets, it is our obligation to ensure that these investments continue to provide the greatest possible return of value to our nation.

Today, the threats against our nation's security and prosperity are more complex and interdependent than a single Cold War adversary, and they intersect with the U.S. responsibilities to ensure economic security for our people, to care for the environment that we live in, and to provide a secure world that benefits our nation and our global allies.

There is little question that nuclear technologies, materials and processes play a vital role in this mission triad with increasing worldwide demand for clean energy, the need to control the spread of nuclear weapons of mass destruction, and the need to mitigate serious environmental challenges posed by nuclear materials and their processing.

It is our obligation to use our nuclear materials workforce, knowledge and assets to help the nation address its critical missions in environmental stewardship, clean energy and national security. SRS must be aggressive in seeking ways to bring unique value to these essential national missions.



Emphasis on the identified business objectives puts SRS on the path toward increased mission impact in the three business segments. As we seek to be proactive in increasing our impact in the environmental stewardship, clean energy and national security business segments, we must articulate and demonstrate the value that we bring to our customers. We must define the products, services and support we can provide for our customers' success.

Business Segments, Objectives and Initiatives

As we move toward a more business-like operation at SRS, we must develop our business objectives, stating the specific positions we want to capture in each of the three business segments. The business segments and business objectives below were developed by a select core team of SRS management, and discussed, vetted and refined by the broader DOE and Savannah River Nuclear Solutions leadership teams.

Business Segment: Environmental Stewardship



Transform liabilities into assets to reduce the environmental legacy of nuclear materials and radioactive waste at SRS in a way that utilizes technology to provide innovative solutions to speed and improve SRS processing and leverages these solutions to other DOE and non-DOE locations and customers

Business Objectives

- ▶ Lead development, validation and assessment of innovative radioactive waste cleanup technologies to accelerate current DOE national program priorities
- ▶ Use SRS's capabilities as solutions to the nation's nuclear materials disposition issues
- ▶ Transform potential liabilities into assets by repurposing excess facilities and/or equipment to address national needs

Business Segment: National Security



Enhance national security by providing innovative, customized solutions to the global nuclear nonproliferation and detection, counterproliferation, deterrence and threat reduction challenges through the application of unique nuclear materials, technology and systems assets at SRS

Business Objectives

- ▶ Lead in nuclear materials disposition to reduce the threat of proliferation
- ▶ Lead in global nuclear nonproliferation, counterproliferation, and threat reduction systems solutions through research and development (R&D), analysis, forensics and demonstrations at SRNL
- ▶ Primary component supplier to the U.S. nuclear weapons Stockpile Stewardship program

Business Segment: Clean Energy



Accelerate the deployment of nuclear energy through public and private partnerships that solve critical nuclear material storage, processing and disposition challenges, and use our broader expertise to support regional energy sustainability while maintaining environmental health

Business Objectives

- ▶ Accelerate deployment of small modular nuclear reactor (SMR) technology
- ▶ Demonstrate clean energy systems
- ▶ Develop and lead the nation's used (spent) nuclear fuel cycle initiatives
- ▶ Demonstrate the environmental compatibility of new modular nuclear reactor and clean energy technologies

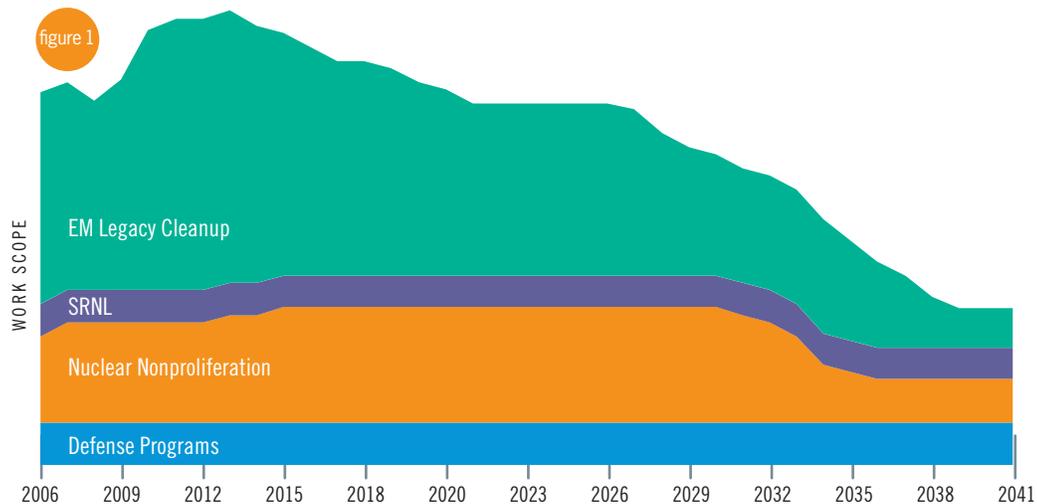
SRS leadership is committed to developing national-level future missions. SRS is not a closure site.

While EM and NNSA current missions remain the highest priority, SRS leadership places great importance on developing broader missions for the Site that use our unique capabilities in order to address national and regional issues. For example, SRS capabilities can be used by DOE to continue high priority work that may be discontinued by sites that are in closure.



How do we build a framework for future mission impact?

In building a new road map to the Site's future, we took stock of our current impact on the triad of environmental stewardship, clean energy and national security business segments.

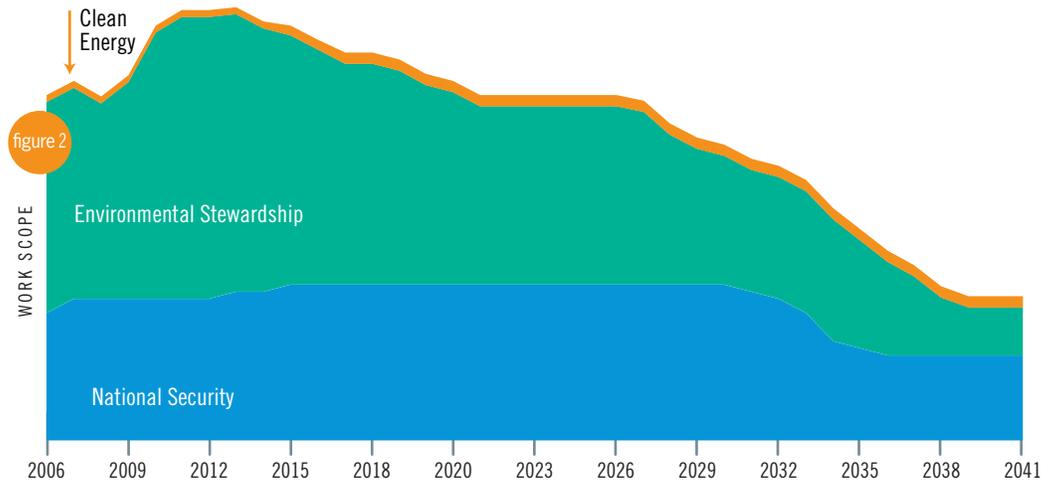


SRS Current Missions: Adhering to the current mission path represents a loss of critical expertise and capabilities that the United States cannot afford to lose.

Today's work is fragmented and our primary work scope is declining.

There are many significant capabilities that SRS currently possesses. However, the chart above clearly and succinctly captures our current and future situation if the present path remains unchanged. Figure 1 shows two aspects of our current and projected future state. First, SRS is viewed (internally and externally) as a collection of separate and disconnected activities. Second, the scope of work (and, therefore, mission impact) is projected to decline significantly over time.

Figure 2 illustrates our current state of mission impact by simply mapping today's work scope into three principal business segments.

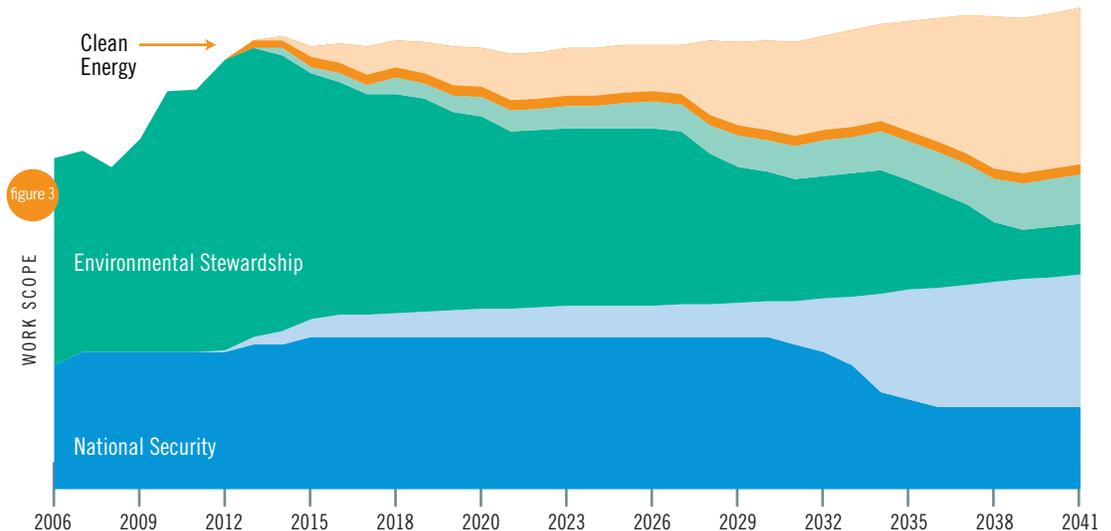


SRS Alignment to Business Segments: This chart illustrates our current state of mission impact mapped into the three principal business segments.

This chart highlights strengths and identifies challenges. In the **national security** mission area, SRS has a very strong base from which to build. The challenge in national security is to steadily increase our mission impact in this area by coordinating resources across SRS and focusing those resources on key national security challenges such as nuclear nonproliferation and detection, counter proliferation and disposal of materials. The nation's **environmental** cleanup work will decrease with time as legacy environmental issues are effectively remediated. However, we can expand our impact by driving technical innovation through SRNL and exporting those innovations to the broader national and international environmental cleanup missions. Today, our work in **clean energy** is limited, but holds long-term promise and our ability to impact the national energy agenda will require bold new Site initiatives.

Work scope growth doesn't come through a dramatic step change. It must be steady in nature.

The Expanded Focus chart (Figure 3) represents an outcome that we might expect if we begin pursuing this approach today.

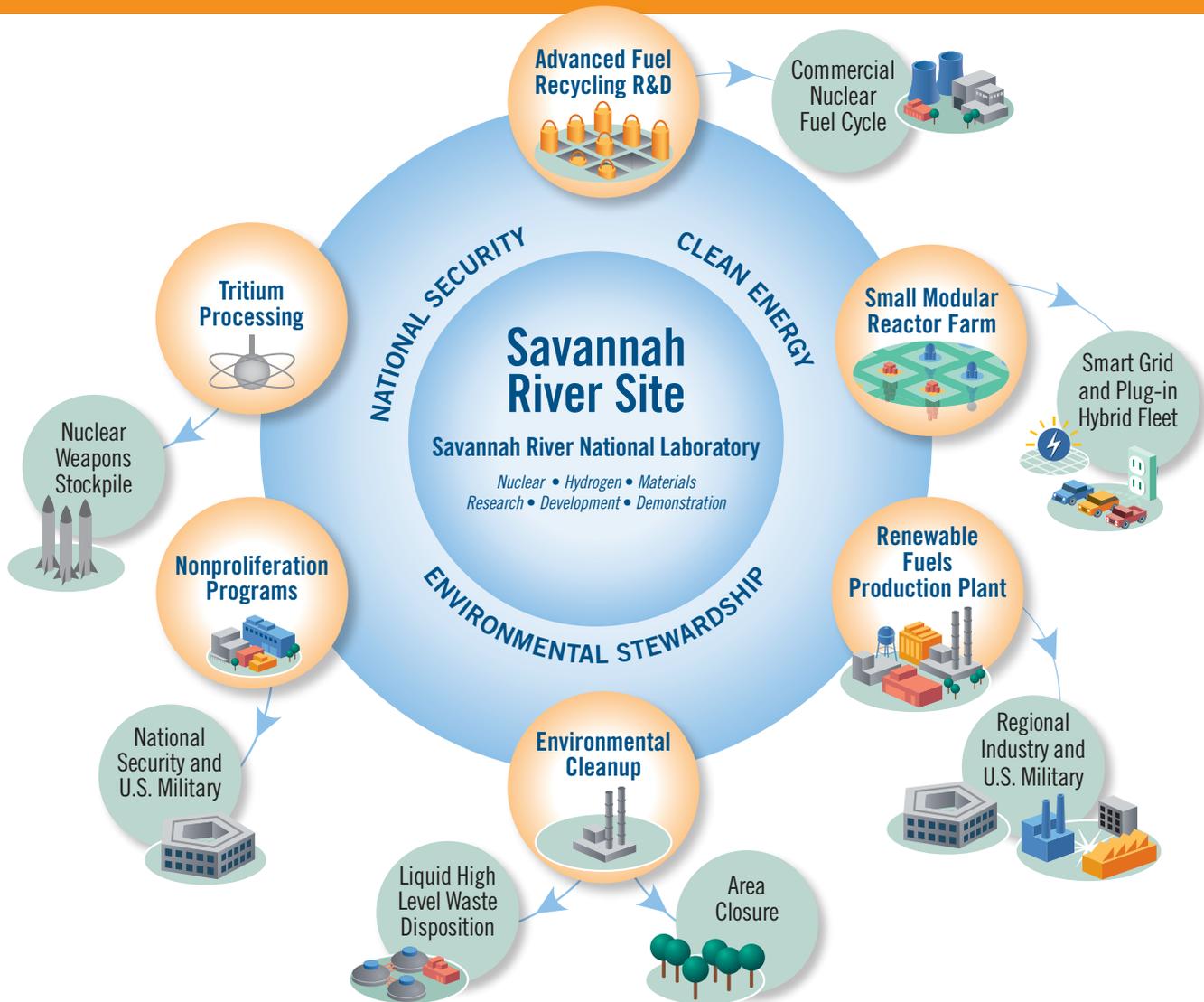


SRS Expanded Focus: This new vision for the SRS future shows a combination of current projected work complemented by growth in scope.

This new picture for the SRS future shows that a combination of current projected work when complemented by growth of work scope through initiatives (depicted in the lightly shaded areas) in environmental stewardship, clean energy and national security can create enduring SRS contributions to national missions while providing strong regional economic impact.

The Enterprise SRS Vision

A part of the DOE Comprehensive Asset Revitalization Strategy



The new business direction for SRS, graphically depicted above, shows that SRNL becomes the central hub as SRS expands into business segments that capitalize on historic SRS competencies and facilities. The ultimate goal is to address selected national and regional issues with these SRS capabilities.

SRS leadership is committed to moving forward with this new vision.

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Where do we go from here?

What has been done so far is exciting and has captured the enthusiasm and commitment of the involved Site leadership. However, each of us involved in this first step understands that we are only at the beginning of our journey to create an enduring, high-impact future for SRS. The following is a set of activities that must follow in order to keep SRS focused on the path to broad mission success.

Pursue top priority objectives

The business objectives identified must be supported with specific and immediate initiatives. Resources must be redirected to begin that work. Pursuing every business objectives is not feasible, therefore a small set of high priority objectives will be selected, so that specific initiatives can be defined and the required resources allocated. Descriptions of some of these strategic initiatives being considered begin on the next page.

Re-shape cultural, organizational and business practices

As important as it is to understand where we are headed, it is equally important to address the cultural, organizational and business operations that will be required to achieve success. In order to expand our national impact, we must adapt our systems to provide the flexibility necessary to meet the needs of our external Other Federal Agency customers. We must also learn how to focus our critical assets, business practices and workforce on multiple on-site and off-site customer objectives. Achieving these ends will require significant changes in our current way of doing business.

Build strong business and inter-agency support networks

The envisioned future demands that SRS become a critical player in missions that engage multiple federal agencies and private sector organizations. We will have to define and build relationships with policy makers, customers, suppliers and competitors, and extend beyond the boundaries of SRS to obtain that future.

Begin work on strategic initiatives

While SRS environmental cleanup, defense production, nuclear nonproliferation and other missions continue, the strategic goals presented in this plan are designed to fully develop SRS capabilities and resources in order that these can be effectively directed to address specific global, national or regional issues.

Broaden stakeholder collaboration

SRS must continue to work with stakeholders to maximize the environmental cleanup and other mission capabilities of the Site. Future success will require a culture built on significant expansion of stakeholder involvement and consultation. Local, state, regional, private sector, other government agencies, and the national scientific community must be engaged to successfully pursue our journey.

SRS management is dedicated to positioning the Site to serve the nation and the region by systematically pursuing the objectives in the business segments shown above.

By more fully utilizing the resident nuclear material management expertise and other unique SRS capabilities such as SRNL, the Site will be instrumental in developing solutions for some of the most difficult challenges facing our nation. A set of strategic initiatives has been identified that will launch SRS onto a path to make this vital national contribution. These Initiatives are listed the next page and are mapped to the business segments to which they contribute. Notice that some initiatives further the progress in more than one business segment.

National Security

Clean Energy

Environmental Stewardship



Strategic Initiatives



Establish Center for Applied Nuclear Materials Process and Engineering Research



Develop Solutions to Close and Better Secure the Nuclear Fuel Cycle



Accelerate Liquid High Level Waste Dispositioning



Accelerate Deployment of Small Modular Reactors



Deliver Disposition Paths for Nuclear Materials



Leverage and Revitalize Site Assets (Facilities, People) to Solve National and Regional Issues



Increase Helium-3 Supply to Aid Nuclear Nonproliferation



Reduce Greenhouse Gas Emission via Clean Alternative Energy Projects



Develop and Deploy Next Generation Cleanup Technologies



Establish Advanced Center for Nuclear Forensics and Attribution



Implement Modifications to Tritium Infrastructure



Expand Reach and Impact of National Center of Radioecology

In light of increased federal budget pressures, it is more and more imperative that every national resource be fully exploited. By moving the management of SRS to a more business-like paradigm, SRS can effectively employ its unique capabilities and provide technical solutions to the American public for crucial national problems.

Unique resources such as nuclear material and environmental management experience, the only large-scale radiochemical separations facility in the country, extensive applied research capabilities at SRNL, and hydrogen expertise reside at SRS and will be brought to bear on such national challenges as curbing dependence on imported oil, reducing production of harmful greenhouse gases, recovery from environmental insult and enhancing national security, among others.



Establish Center for Applied Nuclear Materials Process and Engineering Research

For over 50 years, H Canyon and HB Line have performed radiochemical separations of irradiated fuel and targets to produce materials for national defense, research, medical use and the National Aeronautics and Space Administration. H Canyon and HB Line collectively provide comprehensive materials processing capabilities that can be utilized for the disposition of a broad range of nuclear proliferant materials from either domestic or international sources. The re-emergence of the commercial nuclear power industry offers another opportunity to leverage the assets of the H Canyon facility in the national interest.

H Canyon and HB Line offer a unique combination of capabilities, equipment and infrastructure that are not available anywhere else in the U.S. H Canyon can receive and dissolve irradiated nuclear fuel and targets, separating and recovering many useful products in a series of process cells using existing equipment. H Canyon design flexibility allows for equipment to be replaced or reconfigured to accommodate changing process demands, including the installation of stand-alone, modular processes configured on prefabricated structural frames. HB Line contains a series of shielded glovebox lines that allow “hands-on” processing, including purification, solidification and packaging of smaller quantities of plutonium and other actinides or special products.

As commercial interest in all aspects of the nuclear fuel cycle accelerates, laboratory research and development for existing and advanced fuel cycles can be scaled up and demonstrated in H Canyon. Whether for an individual corporate sponsor or a public-private partnership, the investment made in the facility infrastructure, including “safety class” confinement systems, liquid waste handling facilities and trained workforce can provide a cost-effective option for the advancement of critical technologies for a sustainable nuclear energy future. The replacement cost for H Canyon/HB Line is estimated to be \$15-20 billion and represents a significant startup cost avoidance relative to establishing this kind of capability in a new facility.

Photo: (left) Control room in H Canyon; (right) view from atop HB Line





Develop Solutions to Close and Better Secure the Nuclear Fuel Cycle

One of the most daunting tasks facing further deployment of nuclear power in the U.S. is the question of what to do with the used fuel once it is discharged from a reactor. Other countries have “closed the fuel cycle” and reprocess the used fuel in order to salvage much of the material for use in the manufacture of fresh fuel and reduce the volume of radioactive waste. In the U.S., reprocessing was stopped many years ago by Presidential mandate so used fuel must be stored indefinitely. This approach places our nuclear power program at a significant disadvantage for several reasons. First, large quantities of highly radioactive nuclear used fuel must be stored and managed at significant cost. Second, used fuel stored in this way represents a security, health and safety, and environmental risk that must also be managed. Third, without a current path to safe disposition of used fuel, the commercial nuclear industry is vulnerable to criticism by intervening groups and political pressure which makes investment in new plants unattractive. SRS will address these issues and further develop the safe technological solutions for processing used (spent) fuel and retrieving the useful constituents while converting the waste to a safer form for permanent disposal.



In support of National Security programs, SRS facilities and technologies can be utilized in the development of a more proliferant resistant fuel cycle. These capabilities can also serve as a test bed for national and regional interest in the development or demonstration of enhanced nuclear materials safeguard technologies.

Photo: *Used fuel in L Basin*



Accelerate Liquid High Level Waste Dispositioning

EM's goal at SRS is to reliably complete radioactive liquid waste treatment, safely manage the treated waste and meet DOE commitments to close the liquid waste tanks, while incorporating new technology and to enhance efficiency as we go. In so doing, EM is closing the circle on the legacy of radioactive liquid waste.



The liquid waste system consists of complex, interconnected, high-hazard facilities to safely store, treat, immobilize, and dispose of treated waste. The high-level waste tank farms include a transfer system that includes large underground storage tanks, transfer pipelines, and associated equipment that directs the flow of waste. The Actinide Removal Process/Modular Caustic Side Solvent Extraction Unit is currently operating as a demonstration facility for the Salt Waste Processing Facility. These unique facilities separate the high-activity and low-activity waste through ion exchange and solvent extraction processes. The unique Defense Waste Processing Facility vitrifies the high-level waste fraction from which the glass is currently stored in on-site glass waste storage buildings, pending permanent storage. Saltstone consists of two facilities: the Saltstone Production Facility and the Saltstone Disposal Facility. Saltstone is where the low-level salt waste material is permanently dispositioned in a grout waste form.

The SRS liquid waste system continues to distinguish itself as a leader in technology development and deployment and regulatory processes and stands poised to export all necessary key facets to support the broader DOE-EM complex mission.

Photo: *Salt Waste Processing Facility under construction*



SRNL



Accelerate Deployment of Small Modular Reactors

While nuclear power must be part of the solution to the challenges of energy security and climate change, the construction of large, traditional light water reactors (LWRs) is only part of the solution. There is a need, both in the U.S. and abroad, for smaller, less capital-intensive nuclear plants that use existing infrastructure while overcoming many of the siting difficulties facing large reactors. Consequently, SMRs that are factory-fabricated and can be transported by truck or rail to a nuclear power site are gaining favor around the world. SMRs have capacities ranging from 10 to 300 megawatts electrical and can be designed without the need for onsite refueling. These ideal power sources are essential for locations that require a dedicated, uninterruptible source of power (such as military bases), isolated areas where large-scale electrical distribution is prohibitively expensive, or regions with a modest-sized electrical grid.

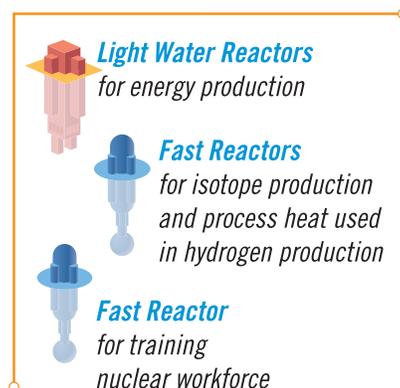
The SRS SMR initiative seeks to facilitate the advancement of SMRs by assisting in the development, licensing, construction and testing of prototype reactors at SRS. The Site provides the opportunity for various SMRs to share utilities, support systems and services, while also having access to unique Site nuclear facilities, a nuclear trained workforce and the potential use of specialty nuclear fuels—plutonium and highly-enriched uranium (HEU)—stored onsite. SRNL, the Site’s applied research and development facility, has more than 50 years of technical experience in aspects of nuclear research. SRS’s unique combination of laboratory expertise, infrastructure, safety culture, location and other factors make this a natural fit.

Another facet of this initiative has been labeled the Southeast Energy Initiative. This initiative capitalizes on a suite of technology choices including the capabilities of the SMRs mentioned above. The underlying concept is that critical national defense locations should have modular, uninterruptible sources of electrical supply in case of natural disasters or military strikes. SMRs and other technologies can allow the U.S. military to meet its pending energy independence objectives by allowing large bases to have their own independent sources of power. This capability would be first deployed to some regional military installations as a proof-of-concept. Locations being considered are in Georgia, South Carolina, North Carolina and Virginia, and include SRS, Fort Gordon and a selected reactor vendor. Once the concept is proven and final technical details are resolved, SMRs and other technologies would be deployed to Fort Jackson, Fort Stewart and Fort Bragg in the second phase deployment.

If an SMR is selected, the location would receive a turn-key system delivered by the vendor and operated by personnel provided by a utility who would be trained and qualified for reactor operation. The reactors are delivered with the fuel installed and sealed within the modular unit. Each is a self-contained LWR with power generation capability.

The advantages of using SMRs for this application are substantial. In addition to providing a secure, uninterruptible supply of electricity for military response operations, this concept reduces the dependence on variably priced fossil fuels, reduces greenhouse gases in accordance with Executive Order 13514, and revitalizes American industry—the providers of the reactor and generator modules. In addition, this concept could easily be deployed in remote locations in conjunction with military action, monitoring activities or natural disasters.

SRS is working with DOE Headquarters and the Nuclear Regulatory Commission on safety plans and licensing for small modular reactors.





Deliver Disposition Paths for Nuclear Materials

SRS's unique facilities and capabilities enable it to support consolidation and processing of nuclear materials from other DOE facilities as well as other U.S. and foreign sources. This is important for reducing risk and nuclear proliferation threats, avoiding the additional costs of protecting materials at multiple sites and enabling closure of other facilities that are no longer needed.

The Site will continue to safely and securely store nuclear materials (plutonium, enriched uranium, used nuclear fuel [UNF] and other nuclear materials) pending disposition in accordance with Departmental mission needs and to meet commitments to the State of South Carolina.

Plutonium

SRS has been placed in a lead role by DOE to dispose of plutonium that has been declared surplus to U.S. defense needs. DOE plans to dispose of at least 34 metric tons of surplus weapon-grade plutonium by fabricating it into mixed oxide (MOX) fuel, where it will be irradiated in existing commercial nuclear reactors. Once converted to spent fuel in the commercial reactors, the remaining plutonium can no longer be readily used for nuclear weapons.

DOE is evaluating four alternatives to dispose of other weapons-usable plutonium that is not readily-usable for MOX fuel. Alternatives include: blending, packaging and shipping to the Waste Isolation Pilot Plant (WIPP) in New Mexico for disposal; processing through H Canyon and vitrifying with high level waste at the Defense Waste Processing Facility (DWPF) at SRS; immobilizing the plutonium in glass in small cans and surrounding the small cans with vitrified high level waste inside a DWPF canister; and providing additional processing to enable the plutonium to be used as mixed-oxide fuel for commercial nuclear power plants.



Used (Spent) Nuclear Fuel

SRS supports the nation's nonproliferation goals by receiving U.S.-origin HEU and low-enriched uranium spent fuel from foreign countries. The UNF is safely being stored in L Basin pending disposition. A potential disposition path, currently under evaluation, is to blend down UNF to a more usable and less proliferable low enriched uranium for use at the Tennessee Valley Authority for the generation of electricity. This disposition path would be similar to the successful HEU blend down campaign being completed at SRS in 2011.



Leverage and Revitalize Site Assets (Facilities, People) to Solve National and Regional Issues



Although SRS was originally built as a part of the national nuclear weapon complex to maintain the U.S. nuclear deterrent, its land and facilities represent unique national assets that can be utilized to address a broad range of other pressing national issues. SRS will actively seek ways to present these assets for more widespread beneficial use by Other Federal Agencies and the community through the DOE Asset Revitalization Program.

In 2011, following direction of the Congress, DOE established its Asset Revitalization Task Force. The Task Force issued its Report to Congress in August 2011. The Report informs the Congress that DOE will seek the support of the local communities, as appropriate, in understanding its asset transition activities and will take into consideration their vision for the future. DOE will also seek to take advantage of the variety of skills, assets, and resources available within, or to, the community. The Secretary has established Asset Revitalization Initiative and the task force to develop recommendations across the full range of potential reuses: clean energy development, environmental sustainability projects, open space or other uses—depending on the needs, capabilities, desires, and existing resources of the communities surrounding DOE sites. The Task Force is also developing a report to the Under Secretaries of Energy that will provide more detail on the Initiative.

Optimum workforce leveraging will be achieved through effective management. Management excellence is essential to the safe, secure and reliable execution of the missions at SRS. It extends to integrating federal and contractor workforce expertise, technology, business processes and procedures, and physical assets to optimize the multi-mission and multi-contractor operations. To achieve management excellence, SRS leadership will foster a corporate perspective and a teamwork culture through communication of a common vision; ensure the SRS workforce is diverse and appropriately sized and aligned to achieve the Site vision; enhance the SRS leadership, administrative and technical skill base; and establish a corporate, performance-based approach to manage Site assets using sound business practices.



Increase Helium-3 Supply to Aid Nuclear Nonproliferation



Helium 3 is a very rare non-radioactive isotope of helium that has numerous applications including uses in nuclear material detectors, oil and gas well drilling, medical research and cryogenics. Helium 3 exists in nature in such small quantities that it is not currently cost effective to separate it from naturally existing helium. However, helium 3 is formed from radioactive decay of tritium, the hydrogen isotope manufactured for use in nuclear weapons. The U.S. and the former Soviet Union have retained helium 3 and sold it for commercial use. The U.S. has provided two-thirds of the world's supply of helium 3 from the SRS Tritium Facilities.

A worldwide shortage of helium 3 has developed because of an increase in demand for nuclear material detectors being deployed around the world to prevent proliferation of nuclear material. The shortage is exacerbated by the decrease in production of tritium because of smaller nuclear weapons stockpiles. Demand for helium 3 exceeds supply by a factor of 10. SRS is actively evaluating methods to increase the supply of helium 3.



Reduce Greenhouse Gas Emission Via Clean Alternative Energy Projects

SRS is heavily involved in several initiatives that will reduce greenhouse gases in accordance with Executive Order 13514. The SMR initiative mentioned earlier will have a significant benefit to this reduction when they are deployed. Further, SRNL's hydrogen center will continue to advance the concept of clean fuels based on the hydrogen technology that SRS has developed over years of tritium research and production. Biofuel research also continues at SRS. In the near-term, SRS is converting local steam and electrical generation facilities to cleaner bio-fueled technology with a reduced greenhouse gas environmental impact.



Hydrogen has the potential to play a major role in America's future energy system. An energy economy based on hydrogen could resolve growing concerns about America's energy supply, security, air pollution, and greenhouse gas emissions.

SRS has over 50 years of experience in developing and deploying technologies for safely and efficiently working with hydrogen. This expertise is grounded in five decades of technology support by SRNL for SRS's work with tritium, the radioactive isotope of hydrogen that is a vital component of modern nuclear defense. SRS operates the Hydrogen Technology Research Laboratory and works extensively with DOE, commercial companies, and national and international universities to expand the hydrogen and fuel cell infrastructure. SRS was awarded the lead for DOE's Hydrogen Storage Engineering Center of Excellence and continues to work with DOE to expand the center's mission beyond transportation applications to stationary and portable hydrogen storage systems. SRS leverages its extensive chemical and nuclear process development and design experience through the development of high temperature nuclear powered hydrogen production systems.

SRS's extensive background and network of hydrogen collaborations makes it ideally suited to lead a National Hydrogen Research, Development and Demonstration (RD&D) Center. SRS's proposed National Hydrogen RD&D Center would consolidate and focus the DOE hydrogen mission to sustain U.S. leadership in this key technology area and to position the Site and the nation as a leader in the R&D and implementation of fusion technology.

Further, the near-term conversion of SRS electrical and steam generation from traditional coal-fired boilers to new bio-fueled plants that significantly reduce Site contributions to greenhouse gases is another demonstration of the SRS commitment to modernize operations and reduce its environmental footprint. At present one bio-fueled cogeneration facility is in full operation and construction is well under way on a much larger, central generation facility that will allow the shutdown of the 50-year-old central coal-fired generation facility. With these alternative energy projects, SRS will continue to address and mitigate the environmental impacts of energy production and use, a role consistent with its Congressional designation as a National Environmental Research Park.

Photo: (Top) Hydrogen research at SRNL



Develop and Deploy Next Generation Cleanup Technologies

Development and implementation of innovative technologies and approaches for environmental clean up continues to be a priority for SRS. Emphasis is on teaming between SRNL, SREL, the DOE Office of Science, and other environmental organizations at SRS.

SRS is host to a research site in the Applied Field Research Initiative program, which provides research teams with access to real world waste sites that present technical challenges. The Attenuation-Based Remedies for the Subsurface Applied Field Research Initiative (ABRS AFRI) team's focus is on developing and exporting technical approaches and supporting technologies to remediate environmental challenges from groundwater contaminated with metal, radionuclide and recalcitrant organic compounds. This effort is under way in F Area and is conducted in tandem with SRS remediation activities. Ecological risk assessment helps determine which Site areas should be cleaned and which are best left alone because of their ecological value. These studies are leading to the next generation of clean up and long-term monitoring approaches and technologies. The ABRS AFRI continues over 20 years of collaboration between SRNL, SREL and the environmental organizations at SRS.

SRS plans to make these new technologies available across the country and internationally to assist others in their own cleanup efforts.



SRNL

Establish Advanced Center for Nuclear Forensics and Attribution

The unique nuclear materials processing and analysis expertise derived from the historical technical support of SRS site operations, provides a base of knowledge that has application in a broad range of national security initiatives for NNSA and Other Federal Agencies. SRNL will establish an Advanced Center for Nuclear Forensics and Attribution to support the growing national need for these critical capabilities in support of evolving federal deterrence policy strategies. Responsive national forensics and attribution capabilities and facilities play a pivotal role in our nation's national defense and law enforcement activities, and the desire for even more robust national capabilities will continue for the foreseeable future.

Addressing the broad national need for expanded forensics and attribution capabilities will require SRNL to continue to conduct research and development on next generation innovative technologies in support of a variety of national security nonproliferation and counterproliferation missions. Those developed technologies will be field tested utilizing SRS facilities and infrastructure in support of their associated national and global security programs. Additional facilities are being made available to support to our expanding role in national intelligence programs that play a key role in forensic and attribution activities.

Implement Modifications to Tritium Infrastructure

The SRS Tritium Facilities are designed and operated to extract, process, and supply tritium, a vital component of nuclear weapons. The SRS Tritium Facilities consist of three primary active process buildings. The H Area Old Manufacturing Facility (HAOM), which began operations in 1958, houses most reservoir handling functions, including receipt and inspection, finishing, assembly and packaging. The H Area New Manufacturing Facility (HANM) supports tritium gas processing, including reservoir loading and unloading. HANM began operations in 1994 and was upgraded in 2004. The third and newest process building, the Tritium Extraction Facility, incorporates new tritium extraction technology into the process. It became fully operational in early 2007.

NNSA has initiated a modernization program called the Tritium Responsive Infrastructure Modifications (TRIM) to consolidate existing facilities, deploy new technology and process equipment, and demolish and remove old buildings. Implementation will result in overall lifecycle cost reduction and assurance of a safe and secure national security tritium mission at SRS. The tritium production mission plays a critical role in our nation's efforts to maintain a nuclear deterrent. The TRIM plan will consolidate and modernize tritium production processes while reducing the cost of the business processes within tritium programs.

Expand Reach and Impact of National Center for Radioecology

SRNL and SREL are teaming with leading U.S. and international universities as part of the National Center for Radioecology. Radioecology is a branch of ecology, which studies how radioactive substances interact with nature and how different mechanisms affect the substances' migration and uptake in the food chain and ecosystems. The Site has long been a premier research center for the study of how radionuclides interact and affect the environment.

There is currently no formal graduate program in radioecology in the United States. One of the chief goals of NCoRE will be to work with key partners to establish a training and education program for radioecologists to develop future capability as the existing pool of experts reaches retirement age. SRNL and SREL will provide training for future generations of radioecologists and environmental scientists, using unique facilities such as the Low Dose Irradiation Facility, unparalleled in providing opportunities for radioecology research. NCoRE will serve as faculty for courses offered at some of the partner universities. NCoRE member institutions will seek out opportunities to collaborate in research projects and development of methods for risk reduction from human exposure to radionuclides and associated chemicals. A core component of the program will be to make the fundamental connection between environmental health and human health risk assessment. We will expand this effort and provide knowledge which will be applied worldwide to minimize and manage any adverse environmental impacts due to the use of nuclear energy or nuclear material (e.g., medical isotopes, nuclear instruments) production.

NNSA Missions

The largest component of Savannah River's national security efforts is in support of NNSA Missions. NNSA has the responsibility to promote national security by applying advanced science and nuclear technology to the nation's defense.

Two NNSA missions are supported at SRS: Defense Programs Nuclear Weapons Stewardship and Defense Nuclear Nonproliferation.

The first mission ensures the nation's nuclear weapons continue to serve their essential deterrence role by maintaining and enhancing the safety, security and reliability of the U.S. nuclear weapons stockpile.

The second mission provides technical leadership and expertise to limit or prevent the spread of materials, technology and capabilities relating to weapons of mass destruction, advance the technologies to detect the proliferation of weapons of mass destruction worldwide, and eliminate or secure inventories of surplus materials and infrastructure usable for nuclear weapons.

NNSA Defense Programs

SRS Tritium Programs have a long history of outstanding performance in safe, secure, disciplined, and compliant operations, consistently delivering high-quality products to our customers on schedule. SRNL provides scientific and technical support to the SRS Tritium Programs, including technical oversight for stockpile stewardship.

We are committed to continued excellence in the execution of four assigned missions that are vital to the United States' national security including tritium extraction and supply, nuclear stockpile maintenance, nuclear stockpile evaluation and helium 3 recovery.



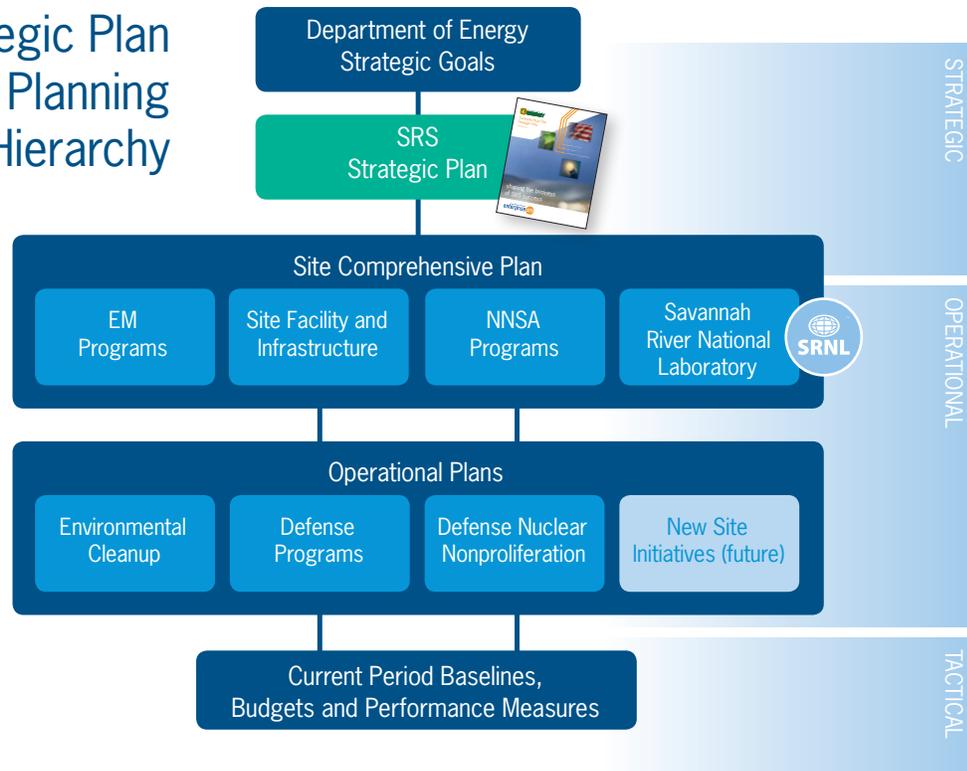
NNSA Defense Nuclear Nonproliferation

NNSA Defense Nuclear Nonproliferation Programs at SRS include Fissile Materials Disposition; Nonproliferation and Verification Research and Development; Nonproliferation and International Security; International Nuclear Materials Protection and Cooperation; and the Global Threat Reduction Initiative. Excluding Fissile Materials Disposition, SRNL has significant program management and execution responsibility for a number of R&D and analysis programs for the other NNSA Defense Nuclear Nonproliferation program areas listed above.

As part of the NNSA Fissile Materials Disposition efforts at SRS, plutonium that has been declared surplus to defense programs will be converted into MOX fuel and following irradiation in domestic commercial reactors it will be rendered unsuitable for future nuclear weapon purposes. This plan is in accordance with multiple Records of Decision and the U.S.–Russia Plutonium Management and Disposition Agreement. Two major construction projects are under way and a third is planned at SRS to implement DOE's plutonium disposition strategy. These facilities are the MOX Fuel Fabrication Facility (MFFF), the Waste Solidification Building and the Pit Disassembly and Conversion capability.

- The MFFF is being built in F Area at SRS to receive weapons grade plutonium oxide, combine it with depleted uranium dioxide, and fabricate the resulting mixed oxide into fuel assemblies for use in domestic commercial power reactors. Operation of the MFFF is scheduled to begin in 2016.
- The Waste Solidification Building is also being built at SRS to convert liquid waste streams from MFFF and Pit Disassembly and Conversion operations into stable, solid forms for disposal as transuranic and low-level waste. Operation is scheduled to begin in 2013.
- A proposed Pit Disassembly and Conversion (PDC) capability at SRS is also being considered to disassemble nuclear weapons pits and convert the resulting plutonium metal and other non-pit metal into an oxide form suitable for making MOX fuel. DOE is preparing a Surplus Plutonium Disposition Supplemental Environmental Impact Statement and plans to issue an amended Record of Decision concerning the proposed PDC capability.

The SRS Strategic Plan in the DOE Planning Document Hierarchy



Acronyms

| | | | |
|-------|--|--------|---|
| DOE | Department of Energy | R&D | Research and Development |
| DWPF | Defense Waste Processing Facility | RD&D | Research, Development & Demonstration |
| EM | Environmental Management | SMR | Small Modular Reactor |
| HANM | H Area New Manufacturing Facility | SREL | Savannah River Ecology Laboratory |
| HAOM | H Area Old Manufacturing Facility | SRNL | Savannah River National Laboratory |
| HEU | Highly Enriched Uranium | SRNS | Savannah River Nuclear Solutions |
| LWR | Light Water Reactor | SRS | Savannah River Site |
| M&O | Management and Operations | SWPF | Salt Waste Processing Facility |
| MFFF | MOX Fuel Fabrication Facility | TPBARS | Tritium-Producing Burnable Absorber Rods |
| MOX | Mixed Oxide (reactor fuel) | TRIM | Tritium Responsive Infrastructure Modifications |
| NCoRE | National Center for Radioecology | UNF | Used Nuclear Fuel |
| NNSA | National Nuclear Security Administration | USDA | U.S. Department of Agriculture |
| PDC | Pit Disassembly and Conversion | WSB | Waste Solidification Building |

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to a new path...





U.S. DEPARTMENT OF
ENERGY

Savannah River Site Strategic Plan

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- NATIONAL SECURITY
- CLEAN ENERGY
- ENVIRONMENTAL STEWARDSHIP

